The Birds of Nepal

PART 12

BY

BISWAMOY BISWAS

Zoological Survey of India, Indian Museum, Calcutta

(*With four plates and five figures*)

[*Continued from Vol.* **60** (3) : 654]

PHYSIOGRAPHY, VEGETATION, etc. OF NEPAL

Nepal exhibits two general surface features, the lowland in the south, and the Himalaya mountains in the north (Figs. 4 and 5).

LOWLAND

The lowland consists of the plain, tarai and bhabar. The former is, in fact, a part of the highly cultivated and densely populated Gangetic plain as seen in Uttar Pradesh and Bihar of India, and is indistinguishable from it.

The **tarai** (altitude *c.* 140-150 m.) is the slightly sunken tract of land lying immediately to the north of the plain. It has come into being by 'filling up by long-continued alluviation of a tectonic basin formed when the strata of the Tethys Sea were folded and raised into the Himalaya Mountains' (Karan 1960, p. 22). Typically, the tarai is a tract where the meandering rivers which are open to annual flooding, flow through alluvium, and give rise to a number of swamps and supports a thick tropical moist deciduous forest consisting chiefly of Sisoo (*Dalbergia sisoo*), Silk-cotton (*Salmalia malabarica*), Khair (*Acacia catechu*), Siris (*Albizia lebbek*), Figs (*Ficus religiosa*, *F. bengalensis*), Palas or the Flame-of-the-Forest (*Butea frondosa*), Tund (*Cedrela toona*), Haldu (*Adina cordifolia*), Jarul (*Lagerstroemia*), a few Palm (*Phoenix*), and large stretches of various grasses, such as Kharaul (*Saccharum narenga*) *Cymbopogon*, *Andropogon*, *Setaria*, etc. Large portions of the tarai have, however, been cleared off for the purpose of cultivation. Such areas are indistinguishable in appearance from the Gangetic plain on the south.

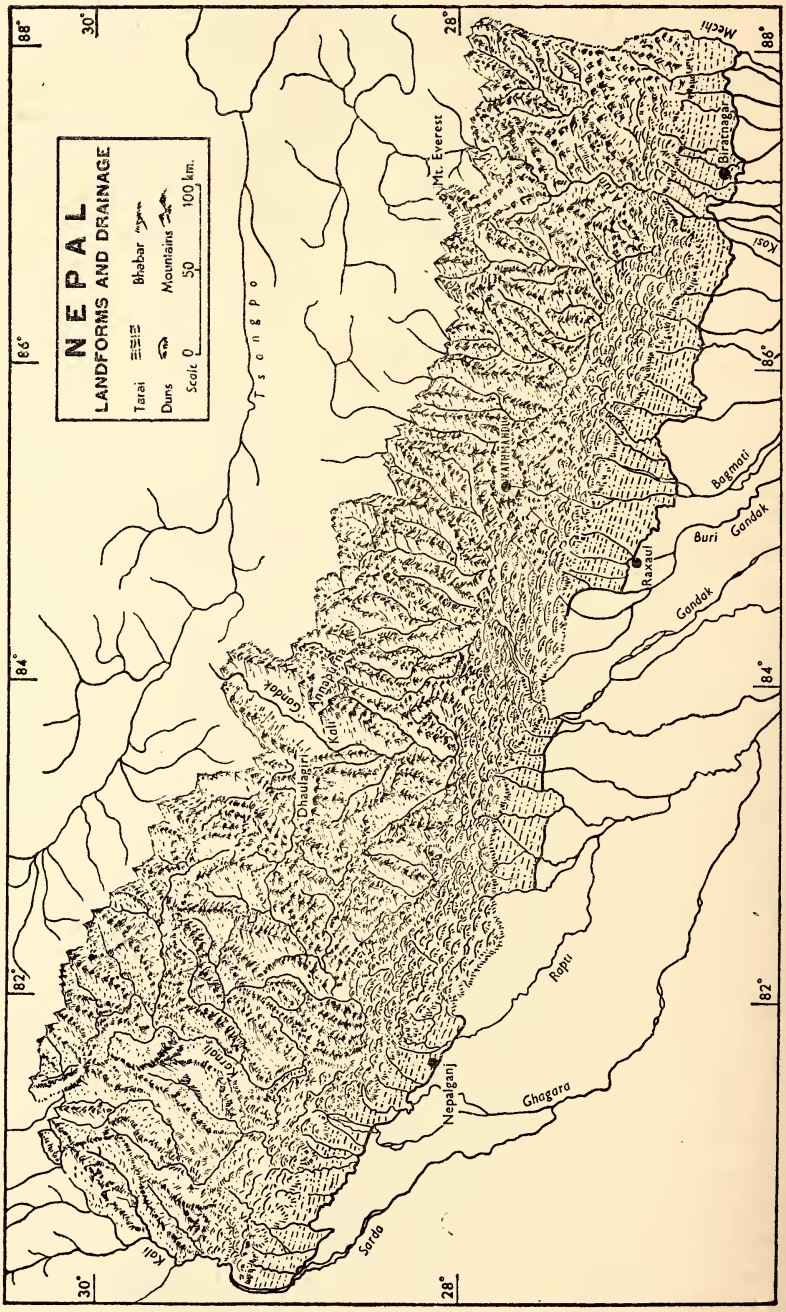


Fig. 4. Land-forms and drainage in Nepal (Adapted from Karan's 'Nepal', 1960)
(By the courtesy of the University of Kentucky Press, Lexington, U.S.A.)

The **bhabar** (altitude *c.* 150-300 m.) comprises a belt of ' hill wash and of alluvial fans composed of highly porous gravels ' (Karan 1960, p. 22), immediately on the north of the tarai. It has a low gradient from north to south. All the streams originating from the southern face of the Siwalik Hills on the north, traverse the bhabar. However, because of the nature of its soil and the gradient, water does not accumulate in this zone, although the silt brought about by the streams is deposited. This makes it possible to sustain a luxuriant moist deciduous forest consisting mainly of Sál (*Shorea robusta*), with some Sisoo (*Dalbergia sisoo*), Silk-cotton (*Salmalia malabarica*), *Bauhinia malabarica*, Sinduré (*Mallotus philippensis*), Haldu (*Adina cordifolia*), Tund (*Cedrela toona*), Asan (*Terminalia tomentosa*), *Phyllanthus*, creepers (*Spatholobus*, *Dioscorea*, *Zehneria*), a thick undercover of grasses (*Oplismenus*, *Setaria*, *Pollinia*, *Andropogon*, etc.) and occasional scrub of *Elephantopus*, *Mimosa*, *Crotalaria*, *Sida*, etc.

HIMALAYA MOUNTAINS

The Himalaya mountains in Nepal may be conveniently divided into four zones from south to north, viz. the Subhimalaya, the Lesser Himalaya, the Great Himalaya and the Tibetan zone.

The **Subhimalaya** or the **Siwalik Range** (altitude *c.* 300-1220 m.) : The low range of hills running east-west throughout the length of Nepal immediately on the north of the bhabar, and consisting mainly of sandstone, sandy limestones and gravel beds, is the Siwalik range. It is known as the Churia hills in Nepal, and is in fact, a continuation of the Siwalik system of the Punjab and Uttar Pradesh of India. Its maximum elevation is about 1220 m., and its ridges and spurs are narrow and sharply edged. It supports thick tropical moist deciduous vegetation composed chiefly of Sál (*Shorea robusta*), with some Sisoo (*Dalbergia sisoo*), Asan (*Terminalia tomentosa*), *Reinwardtia trigyna*, *Lindenbergia*, *Inula*, *Leucas*, and in the upper reaches, *Pinus roxburghii*, *Swertia angustifolia* var. *wallichii*, *Aechmanthera*, *Indigofera*, *Blumea*, *Strobilanthes*, *Scutellaria*, etc., and climbers like *Dioscorea*, and *Sabia*. The undergrowth consists of Sabai grass (*Eulaliopsis binata*) and a few other grasses and scrub.

A large number of streams originate from the Siwalik range. Those taking off from its southern slopes flow into India or form tributaries of other rivers, while those from the northern slopes join several rivers coming down from the Lesser or the Great Himalayan ranges. Those rivers flow south through a number of deep gorges across the Siwaliks into India.

Between the Siwalik range and the Lesser Himalaya on the north are a series of canoe-shaped longitudinal valleys running northwest-southeast

and separated by narrow ridges. These valleys which are more or less wide, are called '**duns**' (altitude *c.* 300-1370 m.). They are thickly clothed with deciduous forest of mainly Sàl (*Shorea robusta*) in the lower elevations and Pine (*Pinus roxburghii*) at the upper reaches, with Sinduré (*Mallotus philippensis*), *Millettia auriculata*, Chilone (*Schima wallichii*), Champa (*Michelia champaca*), Haldu (*Adina cordifolia*), *Callicarpa macrophylla*, Bankar (*Clerodendrum colebrookianum*), wild Raspberry (*Rubus rosaefolia*), *Vallaris solanacea*, *Inula indica*, *Indigofera dosua*, patches of *Phragmitis karka*, *Anthistiria gigantea*, and other grasses and scrub like *Mimosa*, *Phyllanthus*, *Drymaria*, etc.

The **Lesser** or **Middle Himalaya** lying on the north of the duns, is an intricate array of high ranges (altitude *c.* 1370-4570 m.) sprawling east-west throughout the length of the country. These are cut into deep ravines and precipitous defiles which fan out into irregularly directed ridges with repeated ramifications. The southern slopes of its ridges, except in protected valleys, are generally too steep to maintain a soil-cap for the growth of forests, but the northern slopes are gentler and clad with dense vegetation.

Depending on the location and altitude, the forests of the Lesser Himalaya consist mainly of Katus (*Castanopsis*), Ash (*Engelhardtia*), Pines (*Pinus* spp.), Oaks (*Quercus* spp.), Rhododendrons (*Rhododendron* spp.), Poplar (*Populus*), Walnut (*Jugllans*), Alder (*Ainus*), *Magnolia*, Deodar (*Cedrus*), Larch (*Larix*), Fir (*Abies*), Birch (*Betula*), Maple (*Acer*), thin Bamboo (*Pleioblastus*), etc.

The well-defined mountain-range called the 'Mahabharat Lekh', extending throughout the length of Nepal from west to east, lies in the Lesser Himalaya.

The **Great Himalaya** : North of the Lesser Himalaya lies the single range of the Great Himalaya with its lofty mountainous wall rising above the limits of perpetual snow. It completely shields the north. A number of the greatest peaks of the world stand in clusters and rows in this range. Numerous rivers of Nepal, which originate in the north of the axis of the Great Himalaya, cut deep gorges across it to flow southward. The average altitude of the crest of the Great Himalaya in Nepal is more than 6000 metres.

In the lower regions of the Great Himalaya, from about 2450 m. up to the tree limits (*c.* 3960-4264 m.), there are good temperate coniferous forests of Blue Pine (*Pinus excelsa*), Spruce (*Picea*), Oak (*Quercus*), Fir (*Abies*), Cypress (*Cupressus*), Tree Juniper (*Juniperus*), Birch (*Betula*), with Hemlock-Spruce (*Tsuga*), Yew (*Taxus*), some deciduous Maples (*Acer*) and Cherries (*Prunus*), thin Bamboo (*Pleioblastus*), *Lyonia*, Jasmin (*Jasminum*), *Syringa*, *Rosa*, *Berberis*, *Rhododendron*, Larch (*Larix*), Asáré (*Viburnum*), *Spiraea*, *Sorbus*, and some alpine plants, like the Primrose (*Primula*), *Pedicularis*, *Potentilla*, *Androsace*, *Saxifraga*, Gentian

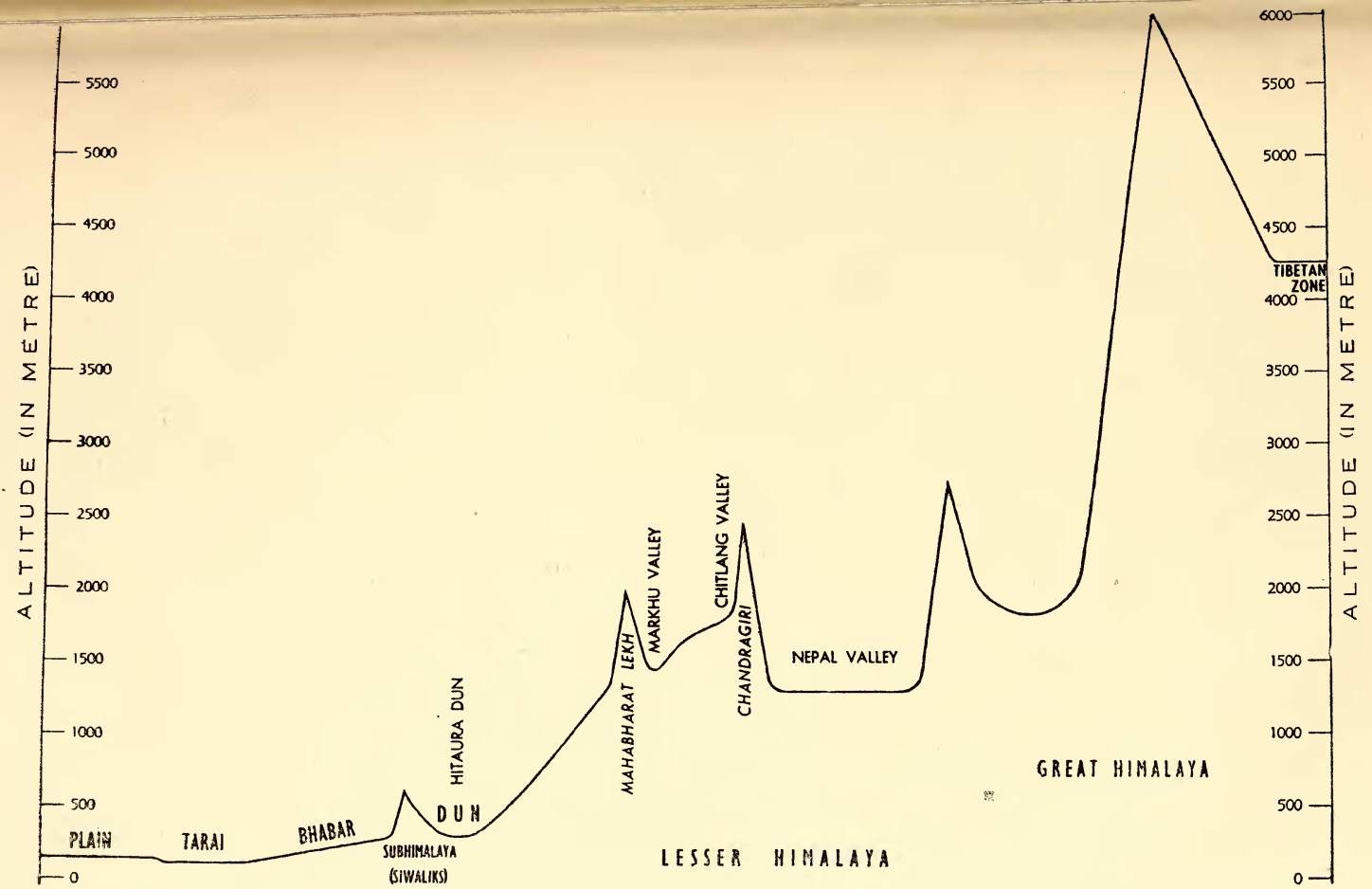


Fig. 5. Hypothetical cross-section of the Himalaya, passing through the Nepal and Chitlang Valleys.

(*Gentiana*), *Iris*, *Meconopsis*, etc., depending on elevation and location. Above the tree limits, the vegetation consists of low bushes of dwarf Rhododendrons (*R. setosum*, *R. anthopogon*), creeping or scaly Juniper (*Juniperus squamata*), Primrose (*Primula*), *Iris*, *Meconopsis*, *Potentilla*, *Pedicularis*, Sedge (*Cyperus*), grass (*Helichotrichon*), etc. Immediately below the snowline, the vegetation consists largely of the grass *Helichotrichon*.

As one goes higher, the number of plants becomes scarce, till on the moraines of glaciers at about 5000 m. or thereabouts, they stand singly or in small clusters.

The **Tibetan Zone** : North of the axis of the Great Himalayan range is the Tibetan zone. Here the mountain slopes gently from south to north up to about 3660 m. The area is largely devoid of vegetation, except for little patches of xerophytic thorny bushes such as of *Caragana*, and grass here and there.

Physiography, Vegetation, &c., of the collecting areas in Central Nepal

The following notes briefly deal with the conditions obtaining in various localities in central Nepal where our collections were made in March-August 1947. Since then, however, conditions there have greatly changed through the interference of man, mainly by large-scale destruction of forests for reclamation of land for agriculture, communications, hydroelectric projects and human settlements.

TARAI

Simra (27°10′N., 84°58′E.) : This is a small village situated near the northern edge of the central tarai, close to the bhabar. There are cultivations about the village, especially in the south, and thick moist deciduous forest in the west, north and east. Two rivers have joined together in the vicinity of Simra to form the Sariswa River, one of which was almost dry during our visit in March. There are also one or two streams with fairly wide beds in the neighbourhood. Altitude : *c.* 140 m.

BHABAR

Amlekhganj (27°17′ N., 85°E.) : This is a large village, the terminus of the Raxaul-Amlekhganj section of the Nepal Government Railway, and situated at the foot of the Siwalik range. There are small plots of cultivation around the village amidst thick forest. A number of hill-streams flow in the vicinity of this village. Altitude : *c.* 300 m.

DUN

Hitaura (27°26′ N., 85°2′ E.) area (with **Suparitar**, 27°28′ N., 85°2′E., **Kusumtar**, 27°27′ N., 85°5′ E., **Paharé Ghat**, 27°26′ N., 85° E., **Karra**,

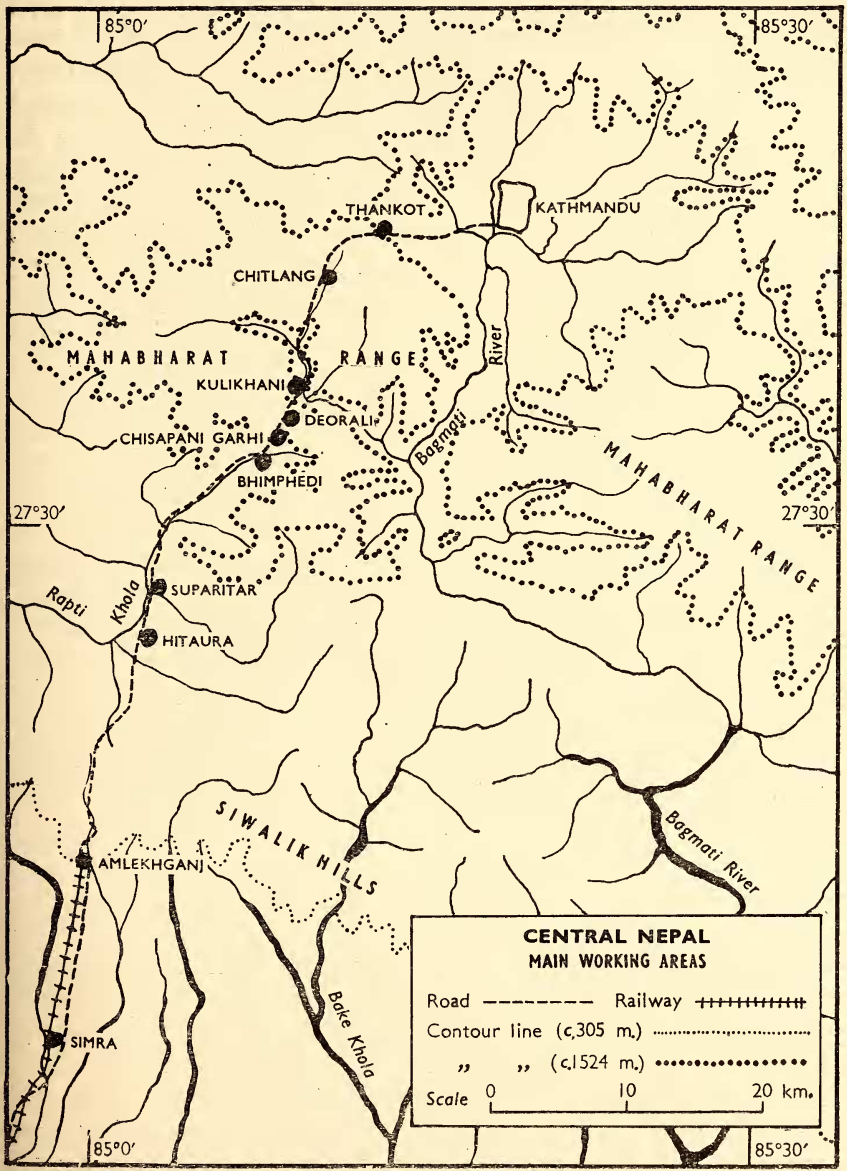


Fig. 6. Map of central Nepal showing main working areas of Koelz-Biswas team.

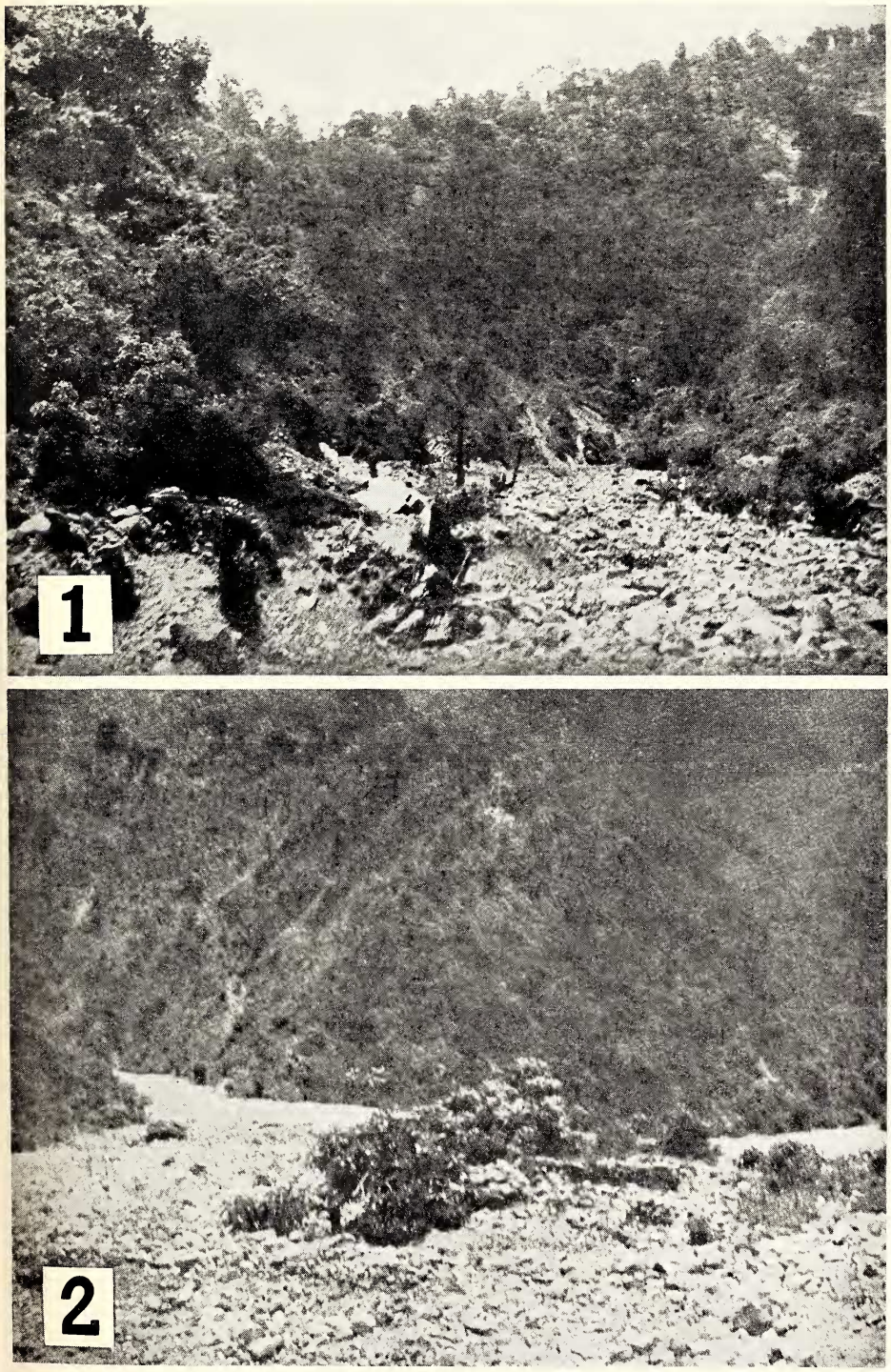
27°25′ N., 85°2′ E. as collecting localities) : This area (Figs. 6, 7) lies in the valleys of the Rapti, Samri, and Karra Kholas. The principal

river of the area, namely the Rapti, flows north to south. North of the Hitaura village, it receives the Samri Khola flowing east to west, and south of the village it receives the Karra Khola coming from east, and a small tributary from the south. The Rapti River then turns sharply westward. Moreover, there are many hill-streams in this area, some of which flow through dark, narrow ravines. The rivers have shingle beds in this area. Apart from a narrow strip of cultivated land along the Rapti and cultivated plots between the villages of Hitaura and Karra, the entire area is well forested. The east-west ridge between the Samri and Karra Kholas, and Paharé Ghat across the Rapti, have thick forests of Sal (*Shorea robusta*), some Lampati (*Duabanga*), Asan (*Terminalia tomentosa*), *Bauhinia*, Kadamba (*Anthocephalus cadamba*), a few Silk-cotton (*Salmalia malabarica*), Amaltas (*Cassia*), *Clematis*, *Drymaria*, and shrubs and weeds like *Mimosa*, *Sida*, etc. Patches of tall grass, like *Saccharum*, *Phragmitis*, *Anthistiria*, occur here and there. The river beds are fringed with thickets of thorny plants and creepers like *Rhaphidophora glauca*. Altitude : *c.* 420-610 m.

Bhimphedi (27°33′ N., 85°9′E.) : Further to the north-east of Hitaura (about 16 km. in a straight line) lies the small town of Bhimphedi, the terminus of the motor route from Raxaul and Amlekhganj. It is situated at the upper limit of the dun on the left bank of the Rapti River at the foot of the Mahabharat Lekh. A number of tributaries of the Rapti, rising from the Mahabharat, flow around the town. The western, northern and eastern sides of Bhimphedi are surrounded by mountains densely clothed with Pine with a mixture of deciduous and evergreen vegetation (Plate I). On the south-west, south, and south-east of Bhimphedi there are some patches of cultivation. There are a number of hill-streams in the vicinity, some of which at places run through deep ravines. The banks of the larger rivers sustain tall grasses and scrub. Altitude : *c.* 1220-1370 m.

MARKHU VALLEY

Deorali (27°34′N., 85°9′E.) : This is a place in name only situated on the northern side of the pass on the Mahabharat Lekh above Chisapani Garhi (= Sissagarhi) on the Bhimphedi-Kathmandu trail. In this area, there is a thin forest of Rhododendron (*R. arboreum*), with some Cheer Pine (*Pinus roxburghii*), Kharsu Oak (*Quercus semecarpifolia*), and bushes of *Luculia*, *Viburnum*, *Rhus*, *Rubus*, *Prunus*, etc. The undergrowth consists of *Clematis*, *Galium*, *Hypericum*, *Valeriana*, *Dipsacus*, *Strobilanthes*, etc., and *Anaphalis*. There are also some orchids, like *Otochilus*, and epiphytes (*Peperomia*). Abundant mosses festoon the trees. A few small hill-streams are present in the area. Altitude : *c.* 1980 m.



1, 2. Forests on the Mahabharat Lekh, east of Bhimphedi, Central Nepal. 19 June 1947.

(*Photos : B. Biswas*)

3. Looking north from Chandragiri Pass, above Thankot. 18 March 1947.
4. Vegetation on northern edge of Thankot Village, Nepal Valley. 18 March 1947.

(*Photos : B. Biswas*)

Kulikhani (27°35′N., 85°9′E.): This is a small village situated on the right bank of the Markhu River below Deorali, and on the trail to

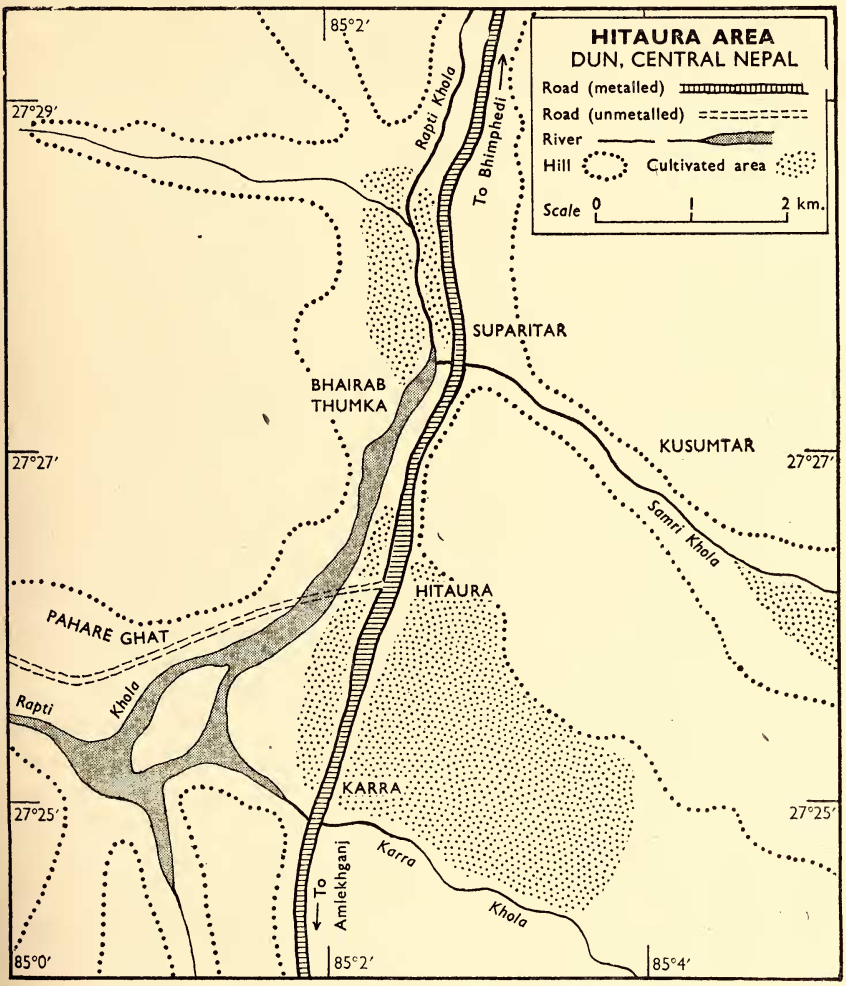


Fig. 7. Map of the Hitaura area, central Dun, Nepal.

Kathmandu. There is extensive cultivation along the river, but to the south and west on the mountain slopes, there are mixed deciduous and evergreen forests. Altitude : *c.* 1400 m.

CHITLANG VALLEY

Chitlang (27°39′N., 85°11′ E.): This is a village lying at the southern foot of the Chandragiri below the pass on the Kathmandu trail, and near the head of the Chitlang Valley. There is extensive cultivation on the south of the village, with patches of scrub and grass here and there.

Such vegetation consists of *Potentilla*, *Teucrium*, *Artemisia*, *Swertia*, *Micromeria*, *Lotus*, *Viola*, *Gentiana*, *Arenaria*, *Oldenlandia*, *Stellaria*, *Pollinia*, *Anthistiria*, etc. A number of small hill-streams flow through this area to join the Chitlang River which takes off from the Chandragiri. On the north of Chitlang, is the thick forest on the Chandragiri. Altitude : *c.* 1830 m.

CHANDRAGIRI

The **Chandragiri** range bounds the Nepal Valley on its western and south-western sides (Fig. 8). It is well covered with forests from its base to the crest, except about the villages situated at its foot. On the outer side, its base lies at about *c.* 1830 m., but inside the Nepal Valley, at about *c.* 1525 m. Collections were made between Chitlang (outside the Valley) and Thankot (inside the Valley) on both faces of the Chandragiri, as well as on the crest in the region of the Pass (27°41′ N., 85°12′E., alt. *c.* 2285-2440 m.).

The forests on the Chandragiri, specially in its upper reaches, are largely of the type which Champion (1936, p. 231) classified as ' Ban oak '. The vegetation consists largely of Oaks (*Quercus semecarpifolia* and *Q. glauca*), Rhododendron (*R. arboreum*), Aru (*Pyrus pashia*), Cherry (*Prunus puddum*), Asaré (*Viburnum*), Angeri (*Pieris*), with shrubs and herbs like *Jasminum*, *Rubus*, *Berberis*, *Randia*, *Ranunculus*, *Artemisia*, *Valeriana*, Fern (*Pteris*), *Lindenbergia*, *Thalictrum*, climbers like *Vitis*, *Smilax*, etc. and grasses (*Andropogon* and others). There are a number of patches where the undergrowth is very scanty, as well as much cut-out treeless areas having thick secondary shrubby growths. The trees are thickly covered with mosses and lichens. In the steeper parts of the slopes, there are thick herbaceous growths with but few trees. Several hill-streams, medium-sized and small, flow down the slopes of the Chandragiri. Some of them have cut deep gorges, dark and damp, overgrown with ferns and mosses.

NEPAL VALLEY

Almost completely enclosed by a series of ridges, the irregularly oval-shaped Nepal Valley (Fig. 8) is situated in the Lesser Himalayan mountain system. The more important of these ridges are the Sheopuri Lekh on the north, Phulchauki Danda on the south-east and south, Chandragiri on the south and south-west, and the Nagar Jong on the north-west. The floor of the valley is more or less level and about *c.* 1220 m. in elevation, but the surrounding ridges range from *c.* 1830 m. to almost *c.* 3000 m. in height (Plate II, fig. 3, and Plate III, fig. 5). The floor of the valley is densely populated and extensively cultivated, even

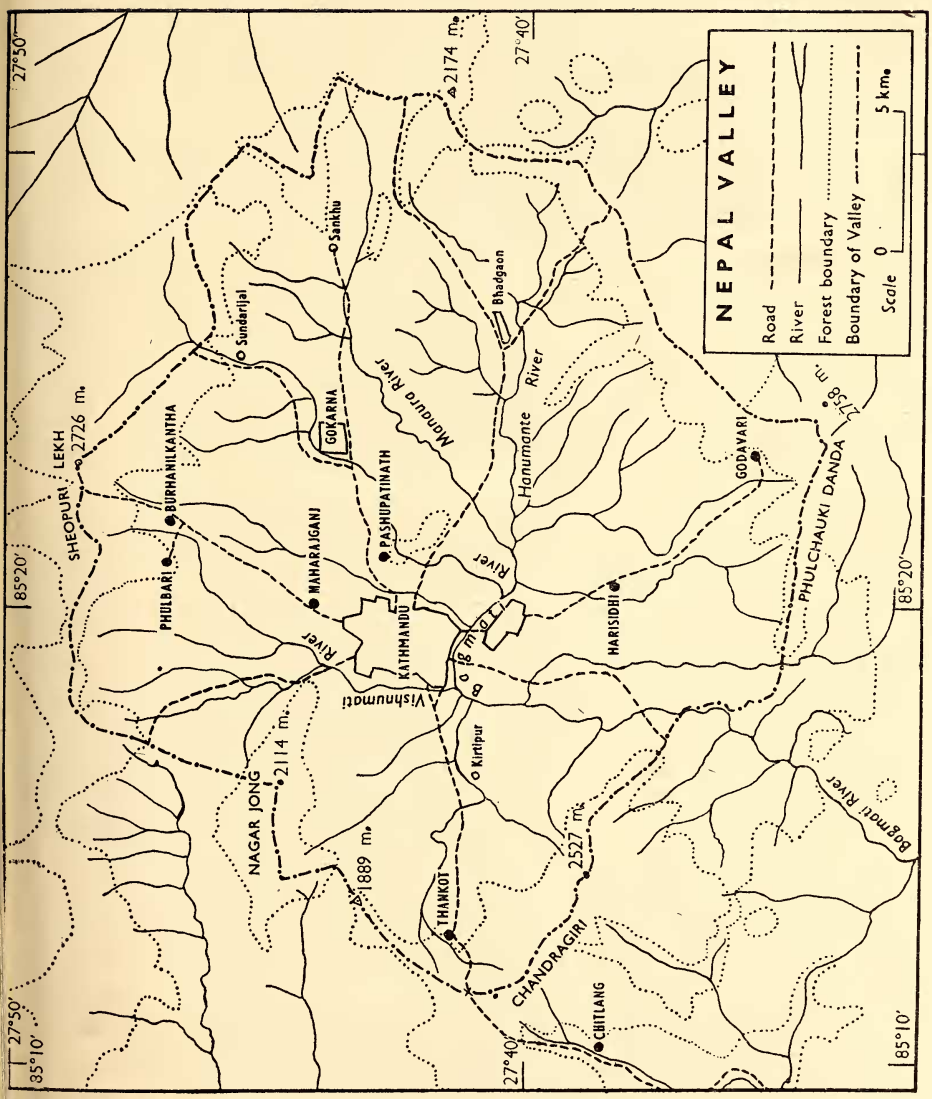


Fig. 8. Map of the Nepal Valley, Nepal.